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IMPLEMENTATION OF ICT IN THE DOMINICAN REPUBLIC. AN APPROACH TO TEACHERS' PERCEPTION

Implementación de las TIC en República Dominicana. Acercamiento a la percepción de los docentes

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ABSTRACT
The main objective of this research is to look into teachers' perception of the EDPJA program in the Dominican Republic, as well as their opinion on ICT training. Likewise, it analyzes the possibilities of information and communications technology. In addition, it develops an analysis of the role of ICT in the workrooms, and the way in which they influence the teaching-learning processes and the possible technical difficulties that may appear. We present a quantitative study with a non-experimental-transverse exploratory type design, with a probabilistic sample of 100 teachers who completed a survey. The results reveal data that need special attention, given the nature of the context in which the study is developed. In this sense, a high percentage of teachers recognize ICT as a fundamental instrument of educational innovation that facilitates learning; however, they admit that they do not have the basic training for the implementation of this technology.

Key words: ICT, teacher perception, teacher training, innovation, education, Youth and Adult Education, Dominican Republic.

RESUMEN
El principal objetivo de esta investigación procura indagar la percepción que tienen los docentes del programa de Educación de Personas Jóvenes y Adultas (EDPJA) en República Dominicana, así como su opinión sobre la formación en el uso de las TIC. Igualmente, analiza las posibilidades que representan los medios de tecnología de la información y comunicación; además, desarrolla un análisis sobre el papel que representan las TIC en los salones de trabajo, del mismo modo que influyen en los procesos de enseñanza-aprendizaje y las posibles dificultades técnicas que se pueden generar a partir de un estudio cuantitativo, con un diseño no experimental-transversal de tipo exploratorio y con una muestra probabilística compuesta por 100 profesores. Por otra parte, un alto índice de docentes reconoce las TIC como instrumentos fundamentales en los procesos de innovación educativa y facilitadoras del aprendizaje; sin embargo, admiten que no tienen formación básica para su implementación. Estos resultados, revelan datos que necesitan especial atención dada la naturaleza del contexto en que se desarrolla el estudio.

Palabras clave: TIC, percepción de los docentes, formación de los docentes, innovación, Educación personas Jóvenes y Adultas.

1. INTRODUCTION

For more than a decade now, the Dominican Republic has been immersed in the dynamics of transformation of the existing paradigms (Sena Rivas, 2013) through the promotion of sustainable projects. The General Law on Telecommunications (Law No. 153-98) considers that the State must promote the development of telecommunications to contribute to the socioeconomic expansion of the nation. In this regard, the *República Digital* Project has been implemented to develop digital platforms that make it possible to improve the legislation on education. Also in this same line, Ordinance No. 02-2015, 2015 establishes in its program that the State shall guarantee the right of all its citizens to free and quality education under equal conditions. This project has focused on the area of technical and technological education. In addition, the following projects have been developed and promoted by the Ministry of Education:

- The program *Compumaestro 2.0* (which provides subsidized computers and creates a 96-hour degree focused on SCRATCH and management of digital education resources)
- The creation of ICT clubs (focused on centers with extended school time and with a critical and abstract approach)
- Special classrooms for teachers to promote technology as a teaching tool through STEM (Science, Technology, Engineering and Mathematics)
- Mobile apps to learn and teach through ICT
- The program *Quisqueya en TIC*, which includes a plan of access to education
- Aesthetic uses of the internet (courses held on the second Tuesday of February to commemorate the Safer Internet Day)
- Robotics training for teachers
- Implementation of computers in libraries
- Laboratories and/or technological areas for pre-primary school children (technology corners)

However, the reach of those projects and the opinion of teachers about the training received still need to be determined, as can be seen in previous studies (Sena Rivas, 2013).

2. THEORETICAL FRAMEWORK

2.1. LITERACY FOR YOUNG PEOPLE AND ADULTS IN THE DOMINICAN REPUBLIC

The Dominican Republic is part of the Greater Antilles Archipelago, situated on the northern hemisphere, to the south of the Tropic of Cancer. According to the data provided by the United Nations Development Program (PNUD, 2015), its population is made up of 10.5 million people; with a Human Development Index of 0.715% and an illiteracy rate of 12.3% among the population between ages 15 and 65, which affects 6.7 million people. Literacy programs for young people and adults are an educational offer that highlights an education in line with the needs of the population that has not finished primary education.

According to the Secretary of State for Education (SEE, 2008), and as part of the ten-year plan for 2008-2018, the main challenges that the Dominican education system must face are numerous. This document lays the foundations to consolidate, expand and diversify the quality of education in order to train citizens with comprehensive values. It also provides a set of basic elements to promote

and encourage continuous training and the learning of the necessary competences to become integrated in the market and to assume the main guidelines of the program. These guidelines include ten policies that define the framework of the initiative.

Constant efforts and initiatives are implemented to increase the education level of the excluded population and to achieve a relationship based on equality. Camilo (2012) points out that Youth and Adult Education is still a challenge. This program wants every citizen to be able to exercise their right to become fully integrated in society. The curriculum of an adult refers to social adults as people who may not have attained the age of majority (as established in the Constitution), but who have to assume conditions and obligations typical of adult people. In this regard, the United Nations Development Program (PNUD, 2015) reveals that, in a global scale, illiteracy in 2012 affects 780 million adults, whereas 168 million children have a full-time job. One in every six teenagers does not finish primary school. In the Dominican Republic, the prevalence of child labor in 2012 was an estimated 12.9%, and the school-leaving rate for primary education (2014) was 9.9%. The illiteracy rate, according to the data provided by the National Statistics Office (ONE, 2015) was 7.7%. These are significant data that require specialized attention, particularly in the framework of adult education.

The legal bases can be found in several articles of Law 66-97. Article 51 establishes the nature of the Subsystem; Article 51 establishes the functions of the Subsystem; Article 53 lists the components that promote development in the social sphere (Diseño Curricular del Nivel Básico. Segundo Ciclo, 2016). It also points out that the objective of adult training is to create alternatives for education so that the population may participate in the development of the country from a social and economic perspective. It emphasizes the quality of an individualized and flexible education that is adapted to the cultural and contextual needs of the citizens included in the program. Also, it defines the "basic learning needs" as the theoretical and practical knowledge, values and attitudes required for people to be able to live and work with dignity, to fully participate in the development of the country, to improve their quality of life and to take essential decisions to keep learning.

Adult education (Grandoit, Canfux, Rivas, Myrna & Camilo, 2008) is marked by inequality and exclusion due to the main challenges it presents, and it is presented as a priority in Articles 51 and 57 of the General Law of Education. The quality of adult education is still a major challenge, although great advances have been made, such as the implementation of a new curriculum model and the development of diplomas in different provinces and workshops all around the country. Still, it is necessary to reflect on some specific aspects such as the following: What is the perception of teachers about ICT? What do teachers think about their own training?

It is important to provide a context about the main lines that define adult education. Flores-Davis (2016) describes it as a practice of coexistence in which the mediator and the learner interact. It is essential to place the person who learns in his or her own context and to respect their interests, needs and learning rhythms. The task of teaching an adult to read and write is a road that opens new horizons and that also gives new hope to the learner. To do so, it is essential to respect the main methodological principles of reading and writing and the learning rhythms of the learner. In this scenario, several aspects need to be considered: the learning pace of the young adult is slower, and the entire learning process must be rescheduled, if necessary, and as soon as possible. It must be complemented with comfortable and safe spaces and it must take place in specific sociocultural environments.

Adults learn better when they find a meaning in what they do and they understand it. This can be achieved through the design of several learning experiences that increase their curiosity, satisfaction and joy. Self-esteem is an element of great importance, because many adults believe that they do not have the necessary abilities to learn, and this prejudice is often confirmed by their family environment.

This argument is complemented with the findings of Ladd Wheeler (2008), who point out that Kurt Lewin already highlighted the importance of the social environment and the learning groups by establishing some principles, such as the promotion of warm and welcoming spaces. In order to obtain a change, the perceptions generated by the cognitive and affective systems must be reinforced. In this regard, Malcolm Knowles (1980), who is considered the father of adult learning through andrology, established that learning in adults must be led by autonomy, previous experiences and their attitude towards life. Their learning requirements are propelled by the imperative need to assume a new role in society. In that same line, Ausubel stated that learning depends on the logical significance of the new information. Clemente (1996, pp. 33-39) states that the time in which the main events of life take place: entering and leaving the school, leaving the parents' house, starting to educate children… (p. 35) are the stages in which subjects interact with different patterns and face multiple difficulties. Baltes (1983, p. 182) describes it as *lifespan*. Medina (1997, pp. 43-44) confirms these statements and points out that practical theories aim to provide a set of recommendations on how to act in order to guide the work of teachers and to transform the methods and goals of adult education. Given the social value that marks adult education, this article intends to provide specific tools to improve that reality.

2.2. POTENTIAL OF ICT IN ADULT EDUCATION (EDUCATION AND ICT)

Technologies have had an impact on education, and they created the possibility to transform the teaching-learning strategies. Carneiro, Toscano and Díaz (2009) point out that the new education programs must take the citizens who they target into account. It is necessary to implement programs that are capable of maintaining young people at high dropout risk within the program, and to focus on the main objective of incorporating strategies for young students to improve. These initiatives must also shape new scenarios for the relationship between teachers and students without leaving aside their main target. The use of ICT in education represents a paradigm shift:

- From education as an industry to education as a service (close to the citizens)
- From schools which teach to schools which learn
- From associationism to constructivism in learning

We may highlight here the potential of computers, which can be used to improve the existing methods and the teacher-student interaction; they can enable alternative methods, promote customized learning and create new methods to face the main challenges faced by the education system. Sein-Echaluce, Fidalgo-Blanco and Alves (2017) declare that communications, ICT, cloud computing and the new trends in collaborative work are necessary to manage information. The diffusion and use of knowledge are generating different enhanced educational tools that make it possible to promote different initiatives in the teaching and learning framework.

ICT represent a key aspect in this context (Cruz-Benito, García-Peñalvo and Pizarro, 2015). They make it easier to study the degree of commitment of the user, which in turn makes it possible to improve their degree of acceptance in order to promote specific contents, implement initiatives to prevent dropout cases, and identify patterns that provide a view of the perceptions and motivations of users (students).

As people interact in the media, they leave a record of different data that can be used in the interest of education. Liu (2017) claims that adaptive learning promotes the process of pattern visualization of the behavior of participants and facilitators. This provides multiple adequate materials to promote a framework with substantial and essential resources to design initiatives based on the characteristics,

profiles, previous knowledge and learning styles of the students. These data may be very useful and productive in the process of analysis and as a reference in the process of adaptation of the adult education programs.

2.3. RELEVANT FACTORS WITH ICT

It is necessary to consider the possibilities or access availability of the different media in students' homes. The National Statistics Office (ONE 2015), in its ENHOGAR-2015 survey, reports that 96.7% of homes have at least one ICT device and/or service. 69.7% of the population aged 12 or over used the internet in the last months, and 94.0% use their mobile phones. From this perspective, it is necessary to design specific policies adapted to that generation, together with criteria to make their integration a reality. Aviram (2002, cited by Marqués 2013) identifies three elements that must be taken into account to adapt to an ICT context: First, to adapt the contents through simple initiatives and to integrate them and the education program as a tool to improve productivity. Secondly, to introduce new teaching-learning methods that include the use of ICT as a cognitive tool that can improve intelligence and promote the learning quest. Finally, to create a holistic scenario that leads to a deep restructuring of all of its elements.

Technologies have had an impact on different areas: communication, expressive media, teaching media, entertainment media for cognitive development, the process of information managing, organization, teacher training and learning environments. They provide greater relevance for informal education and greater transparency for the design of educational tools. There are three main reasons to integrate ICT in education: digital literacy (all students must acquire basic skills in the use of ICT); productivity (taking advantage of the benefits they provide); and innovation in teaching practice (using teachers' potential to make students do new and relevant activities).

In order to turn their impact into a reality, different conditions are required to facilitate the inclusion of ICT in the teaching-learning processes. Carneiro, Toscano and Díaz (2009) underline the significance of funding; sustainability; the development of significant, appropriate and sufficient contents; the training of teachers on digital competences; and the identification of working strategies. However, Ramírez, Renés and Aguaded (2016) establish a difference between the activities that affect the users' health negatively and positively, and urge users to be aware of the risks involved in the abuse of these resources and to assume the basic skills in this field, together with the entire set of objectives, basic competences, contents, teaching methods and assessment criteria of this education stage.

So that the transcendence of ICT is planned coherently and in line with methodologies based on the support to teaching and teachers and accompanied by a constant assessment focused on learning, Romero-Martín, Castejón-Oliva, López-Pastor and Fraile-Aranda (2017) and Gutiérrez-Martín and Tyner (2012) warn us not to make the mistake to reduce media education to the development of digital competences or to limit those digital competences to their technological and instrumental dimensions.

2.4. A TOOL FOR INNOVATION IN EDUCATION

Sein-Echaluce, Fidalgo-Blanco and Alves (2017) define innovation as the application of an idea that causes planned changes in the processes of education, services and products; and which improves the learning objectives. It is a clear proposal that promotes the establishment of a design that involves a creative career and opens the door to completely new possibilities (Mortensen, 2017). We need quality schemes that challenge our daily conditions and can lead to new ideas with specific tools, in

order to start a creative revolution in our day-to-day activities. Three principles emerge in this context: re-expression (re-expressing in different ways and from a different perspective); revolution (thinking differently) and the establishment of random associations (thinking outside of the box when faced with a challenge). In this regard, we need to develop new ways of thinking to design better solutions, services and experiences to solve our current problems with a human-centered approach (Dam & Siang, 2017). That is, we need a holistic approach for these challenges combined with models for social innovation and management practice that pay attention to the behavior and the expectations of the new consumers. It is necessary to include less rigid changes with the ability to understand and promote successful innovation.

In a world marked and surrounded by media communication, there is a pressing need to enter a dynamics of constant innovation in education programs. Integrating ICT may provide a teaching-learning environment for the students and for the teachers (Domingo & Marqués, 2011). This is a medium that promotes the collective creation of knowledge (Adell & Castañeda, 2012). Emerging pedagogy represents a group of approaches around the use of ICT which try to take advantage of their entire communicative, informative, collaborative, creative and innovative potential within the framework of the new learning culture. As a response, they offer an open model to the users (Von, 2011), and this is a model which is constantly being improved and in which there is a combination and coordination of efforts oriented to innovation through ICT resources. Functional relationships are created in order to take advantage of products that have been developed by other companies. We may highlight the additional incentive or the added value provided by the innovation process (which includes the enjoyment and learning it provides or the satisfaction of solving the problems presented by the innovation process). To do so, two asymmetrical types of information are required: from teachers and from learners. Also, it is essential to know the needs of their context to find a middle ground and to develop proposals for both spheres.

In this same line, Brower & Christensen (1995) presented disruptive technologies (Christensen, 2012) as a point of convergence for what is new and what is known. In practice, it represents a starting point associated to constant change. This model promotes the social construction of knowledge, as well as collective intelligence. It lays the foundations of the relationship between data and descriptors, encases the richness of the user experience and allows students to learn among their peers. However, the attitude of the facilitator dissents from that dynamic, according to several studies (TICSE 2.0, 2012, p. 213). Educators must become part of these dynamics with a higher degree of involvement (Chao-Fernández, Román-García & Chao-Fernández, 2016). In spite of all this, the society of knowledge requires a transformation in the learning-teaching processes through an adequate use of the media.

2.5. ICT IN THE CLASSROOM

TICSE 2.0 (2012) reports that ICT have a relevant impact on the improvement of motivation in the classroom, and that new methods are required. Teacher training is essential to incorporate ICT into the education practice, and this training must be based on both theoretical and practical competences. It is fundamental to promote a set of three decisive competences (Ramírez, Renés & Aguaded, 2016). Also, this initiative must include media competence which encompasses all the competences related to the media or to audiovisual tools. These skills have become a central point of attention due to the intensive use of new media (García & Said, 2017). Also, with the process of socio-technological consolidation of the Web 2.0, the rise of the free culture movement and the Semantic Web and the development of a culture of transparency, the metamorphosis of society into a liquid modernity is

triggering constant transformations. In view of this scenario, media literacy represents an alternative which embraces different skills and makes it possible to use these resources safely and effectively, and to take advantage of the great range of opportunities that are available in those spaces.

2.6. New technologies as facilitators in the teaching-learning process

New technologies as facilitators in the teaching-learning process focus on the main goal of education and on diagnosing afterwards the procedures and conditions for the presence of ICT in this field. Defining the orientation of the educational features may be helpful in the first stages of the process to renew the nature, equity and impartiality of the educational sphere. It is essential to create a bond between the development of a favorable attitude, the capacity of the learner and ICT in order to learn.

A study by Dahlstrom, Brooks & Bichel (2014) claims that technology is embedded in the life of students and that it has a positive influence on learning. McGloin, McGillicudd & Christensen (2017) have proven that it also promotes intrinsic motivation, which enables the cognitive immersion associated to performance in learning. Also, the teacher may stimulate students in the classroom and have a positive influence on their habits of learning. In the study carried out by Çakiroğlu, Yildiz, Mazlum, Güntepe and Aydin (2017) which associated learning experiences with ICT-mediated activities, the researchers claim that these tools allow teachers to develop collaborative experiences through design approaches, to act individually or to share ideas. Along this process, students develop a deeper conceptual understanding as they build new knowledge, improve their skills, take on more responsibility for their learning and share their knowledge in a collaborative context.

2.7. Technical difficulties

Among the main limitations of ICT, Marqués (2012) highlights that they require hardware and software and that they involve a risk of having excessive dispersed information, a rigid communication model and constant changes in the tools used, as well as the added risk of feeling discouraged.

There are many drawbacks, and it is important to know them so that they can be improved. Some authors (Cacheiro, 2014; Majo & Marte, 2002; Cabero, 2002; Cabero & Romero, 2007; Coll & Nereo, 2008; Rodríguez, 2009; Gómez, 2011) have described different aspects of ICT which can be improved:

- They may represent a distraction if the process has not been properly planned.
- The large amount of information available online may make participants waste their time to locate information.
- ICT must be complemented with other methodologies in order to prevent isolation from other forms of communication.
- An excessive use of ICT may cause eyestrain.
- It can cause technical problems such as power blackouts, hardware deterioration, lack of broadband connection, or computer viruses.
- Not all families can afford computer devices.
- ICT do not teach or prepare the lessons by themselves. It is necessary to implement training for teachers and students.
- There must be a constant monitoring of activities in the teaching-learning processes.

2.8. ICT TRAINING FOR TEACHERS

ICT training for teachers is a significant aspect that represents an important step in teaching support. Bautista, Borges and Forés (2006) claim that this is a strategy that is linked to the way in which people interact in this society, and that it can be extrapolated to different dimensions (McCloskey, 2012). For teachers, it creates the need to set new goals which involve different parallel and advanced competences to interact with members of a different culture. Teachers can visualize themselves directing cultural research and collecting data, and as agents that can design education opportunities which are flexibly oriented to the very nature of knowledge: with their disposition, meta-cognition and awareness as tools that can be used for a significant purpose. Professional development must have a more perfected approach that adapts better to competences and promotes interaction with other professionals. Technologies appear in this context as a tool for creating a relationship with which we can communicate with each other and learn. Technology makes it possible to promote affective and intercultural competences that provide mechanisms to support the different formative cycles.

Some aspects that must be taken into account in teacher training include the provision of spaces to promote the practice of reflections from two perspectives: the learner and the teacher. Teachers learn by observing from different perspectives and through the training of teacher media and information literacy (MIL). There are several factors that support the need to train teachers, including the following (Wilson):

- the spread of telecommunications;
- the need to create equal conditions between those who produce knowledge and those who receive it;
- an exponential increase in the number of texts and messages in the media, and the inclusion of the right of information access and exchange as part of the human rights. For these reasons, it is essential that teacher-training programs follow the following recommendations: first of all, those responsible for the education program must be available for tasks of training, support and guidance, and provide spaces to enable access to all necessary resources.

Teacher training must give priority to the appropriate competences, abilities and attitudes focused on best practices in education which are increasingly necessary in our society.

3. OBJECTIVES AND HYPOTHESIS

The initial objectives are:

OE1: Knowing the opinion of teachers about ICT in Education.

OE2: Knowing the perception they have about their own training in ICT.

The perception that teachers have about ICT (Tejedor, García-Valcárcel & Prada, 2009; Ramírez, Cañedo & Clemente, 2012; Calderón & Piñeiro, 2007) represents a direct influence on different attitudes of teachers towards innovation processes. These attitudes may be affected by three factors: resistance to change, self-esteem and frustration. However, different studies show a pattern which repeats itself in the processes of ICT integration:

- Creation of high expectations about the technological environment and its ability to create innovation in teaching processes.
- Application of technology and use until it becomes normalized.

- Discovery of its low impact and low success in education due to a lack of resources and insufficient teacher training.

The real challenge of education does not lie in technological innovation, but in pedagogical innovation. Knowing the perception of teachers makes it possible to design different constructs and opinions to determine and/or reorient the different initiatives in the context of the different attitudes, particularly with regard to the affective and behavioral components. Ramírez, Cañedo and Clemente (2012) state that perceptions are a determining factor for ICT use and that they condition positive attitudes and increase the chances that they are actually used. The use of ICT is directly linked to digital competence and does not involve the use of ICT in a practical context.

The starting hypotheses are the following:

H1: Teachers have a positive perception with regard to the use of ICT in the classroom.

H2: Teachers consider that they have adequate ICT training.

A favorable perception of ICT resources is positively associated with an adequate training to handle ICT resources for teachers in the program of Youth and Adult Education.

4. METHODS

In order to structure and characterize this work, we devised an approach primarily based on a quantitative study with a non-experimental cross-sectional exploratory design about a topic which has not been widely discussed in the literature when referring to the country that we analyze in our study: the Dominican Republic.

The study uses a research tool that has been tested and validated by previous research that is an evidence of the proficiency of many authors (Tejedor, 2010; Barrón, 2009; Fernández, 2003; Zabalza, 2003; Carmona, 2008; Marqués, 2011; Hernández-Carranza, Romero-Corella & Ramírez-Montoya 2015), and which has been adapted to the context of the framework in which it is being implemented.

In order to solve the questions set out in our research and verify or reject our hypotheses, our starting point was established through the options of the surveys, which are considered some of the most reliable tools for our objectives.

Mauceri (2016) states that surveys are useful to suggest potential helpful intersections between quantity and quality based on a hypothesis, and that "social surveys are one of the most widely used types of survey in quantitative social research. It is a method to obtain information through oral or written questions asked to a universe or a sample of people who have the characteristics required by the research problem." (Briones, 1996, p. 51).

From that perspective, the survey "is the combination of the different schemes that are targeted at finding exclusive answers from a specific population." (Bosch, 1993, p. 9), and which can be beneficial and provide accurate results when it implements research studies about the conclusions or opinions stated in them (Herrero & Acle, 2013).

It is an adequate tool because it makes it possible to register abundant information. The survey is an instrument that can encompass different holistic perspectives about the different teaching areas (Briones, 1996, p. 51), as in the case of our study.

We believe that the use of this tool is adequate, because studies with surveys (Salkind, 1998) are appropriate or favorable to research the frequency of constructs such as stances, perceptions, conventionalisms, preferences and verdicts of facilitators, which are the nucleus of our work.

In a first stage, an outline of the questionnaire was created:

> "the main tool to acquire the data of our research was embodied by the survey. It is a record of questions structured according to the objectives of our research which adapt homogeneously to the respondents included in our sample." (Cea, 1992, p. 43).

The variables that were finally included in the survey are included in Table 1:

Table 1. Perception of ICT by teachers

They are a tool for educational innovation
They enable collaboration with colleagues
They are essential to create dynamic and innovative strategies in the working rooms
They make the teaching-learning process easier
They enable group exchanges
They promote group work
They promote individual work
They pose some technical difficulties
They generate isolation
I consider that teachers have an adequate training (yes/no question)

Source: Compiled by author.

After an analysis of the advantages, usefulness and disadvantages of the different ways in which the surveys could be completed (in person, online, over the telephone…), we finally decided to use a telephone survey.

The items in the survey are the result of preliminary research, and the final guidelines were inspected by professors from the University of Salamanca. In order to establish the reliability of the survey, Cronbach's alpha was calculated, with a final result of $\alpha = .903$.

4.1. POPULATION AND SAMPLE

After the survey was structured, the next step involved selecting the sample of our study, a process that must be implemented carefully and appropriately due to its transcendence on the results of any experiment with a population sample (Salkind, 1998, p. 96). This selection is "the basis of the inferential method. Otherwise, it would be impossible to test all the members of a community, and the only option is to select a sample" (Salkind, 1998, p. 96). The validity of the sample increases with its similarity to the population: "When a sample is chosen for a study, the primary objective is to draw one that truly represents the population" (Adams, 1989, p. 47).

One preliminary idea was to use a probabilistic sample, and to do so, the population had to be sampled, taking into account that "the starting point for the design of a sample is the definition and delimitation of the population or the universe which is being studied" (Cea & Valles, 1992, p. 279).

For this particular initiative, the population is made up of the group of teachers who work as facilitators in youth and adult schools of the Dominican Republic. The entire population could not be reached due to the abundance of data. In order to contact the teaching staff, we first used primary sources; the first stage involved listing the number of Youth and Adult Education Centers in the Dominican Republic. To do so, the following organisms were screened:

- National Coordinating Council of the Department of Youth and Adult Basic Education, which is part of the Directorate of Adult Education of the Dominican Republic Ministry of Education
- General Directorate of Adult Education of the Ministry of Education

After the primary sources mentioned above were contacted, they provided the total figures regarding the number of Youth and Adult Schools, but it was not possible to survey all the teachers and students. Data are shown in Table 2.

Table 2. Youth and Adult Education Centers in the Dominican Republic

Regional divisions	Youth and Adult Education Centers
1	19
2	27
3	41
4	36
5	26
6	39
7	51
8	33
9	12
10	74
11	32
12	21
13	12
14	34
15	74
16	58
17	23
18	37
TOTAL	649

Source: National Coordinating Council of the Department of Youth and Adult Basic Education of the Directorate of Adult Education of the Dominican Republic Ministry of Education and General Secretariat of Adult Education // Compiled by author.

In this selection process, and in order to ensure the quality of the data from the education centers in our study, a random sampling principle was chosen. The regional divisions were randomized and stratified and three of them were selected: 1, 15 and 16. After the regional divisions were delimited, the sampling of the teachers was performed based on convenience, taking into account the viability, possibility and accessibility referred by the teachers. A confidence level of 95% and a confidence interval of 9 were established.

In total, 100 surveys were completed over the telephone by a sample with the characteristics shown in Table 3.

Table 3. Characteristics of the sample

Sex	Men	43%
	Women	52%
	DK/NA	5%
Age (years)	20-30	15%
	31-40	43%
	41-50	23%
	51 or over	15%
	DK/NA	4%
Years of experience as teachers	0-5	16%
	6-10	21%
	11-15	21%
	16-20	15%
	21-25	8%
	26 or over	15%
	DK/NA	4%
Highest level of education completed	Currently studying a Degree	5%
	Degree	56%
	Teacher certification	2%
	Currently studying a Master	12%
	Master	16%
	Doctorate	1%
	Other	3%
	DK/NA	5%

Source: Compiled by author

5. RESULTS *

Out of the 100 facilitators in the Youth and Adult Education program, the average age was 31 to 50 years and 52% were women with a university degree and 6 to 20 years of experience as teachers (Table 3).

In general terms, the following results were obtained for hypothesis 1 (Table 4) and for hypothesis 2 (Table 5):

Table 4. Results for H1

	Disagree	Partially disagree	Partially agree	Completely agree	Average
They are a tool for educational innovation	3%	8%	20%	69%	3.55
They enable collaboration with colleagues	3%	9%	29%	59%	3.44
They are essential to create dynamic and innovative strategies in the working rooms	7%	8%	20%	65%	3.43
They make the teaching-learning process easier	4%	9%	27%	60%	3.43
They enable group exchanges	3%	11%	36%	50%	3.33
They promote group work	7%	14%	35%	44%	3.16
They promote individual work	5%	19%	45%	31%	3.02
They pose some technical difficulties	12%	24%	34%	30%	2.82
They generate isolation	27%	28%	27%	18%	2.36

Source: Compiled by author

Table 4 shows that 69% of teachers agree about the first question. In addition, 65% claim that ICT are essential to create dynamic and innovative strategies in the working rooms. 60% report that they make the teaching-learning process easier. However, their agreement decreases about the idea that ICT enable group exchanges, pose some technical difficulties, and generate isolation.

Table 5. Results for H2

Yes	No
17%	83%

Source: Compiled by author

The results of Table 5 show the opinion of teachers about general ICT training. There is a surprisingly high percentage of teachers who believe that they do not have a basic training in ICT, which contrasts with the low percentage of those who claim that they do.

6. DISCUSSION

Based on experience in the field of education and on the literature review that was performed, we have identified a set of criteria to analyze and discuss the implementation of ICT as a tool for educational innovation through the opinion and perception of teachers. The implemented methodology was useful for adequate interactions and information collection. In this regard, the survey that was carried out through the telephone had been tested and validated by preliminary research and inspected by professors from the University of Salamanca. In order to establish the reliability of the survey, Cronbach's alpha was calculated, with a final result of $\alpha = .903$. On the other hand, a probabilistic sample with random sampling was used to ensure quality. The main limit of the study was the fact that our topic of study had not been extensively approached from a scientific perspective before when referring to the geographical limits of the country in the analysis.

The study shows a high percentage of teachers who believe that ICT are an essential tool to create dynamic and innovative strategies in the working room, and as facilitators in the teaching-learning process. These findings are in line with the results found in the area of social research in Latin America. In addition, this information has been corroborated by other research. Some authors (Cañedo & Clemente, 2012; Álvarez-Quiroz & Romero, 2015) claim that digital resources promote motivation and improve the quality of teaching. On the other hand, these statements agree with the findings of Adell and Castañeda (2012), and Domingo and Marqués (2011), among others, when they state that ICT can provide an innovative environment. This all nurtures the generalized idea that they can be used to face the determining challenges faced by the role of education in current society. However, other studies consider that it would be advisable to take into account some factors that qualify innovation processes. In this regard, Sein-Echaluce (2017) points out that innovation is defined as a planned change (Mortensen, 2018), and consequently proposals are needed to challenge daily assumptions (Dam & Siang, 2017). Therefore, a holistic approach of social innovation models is required when faced with a world marked by media communication (Christensen, 2012). From that moment on, innovation materializes when new and known ideas converge (Domingo & Marqués, 20122). In sum, ICT represent a resource that promotes the creation of knowledge. Therefore, it is necessary to develop new ways of thinking in order to design better solutions, services and experiences to solve our current problems with a user-oriented approach.

Another aspect highlighted in this study is that teachers show disagreement regarding the statements claiming that ICT enable collaboration between colleagues, promote group work and generate isolation. According to the literature, these factors have important repercussions on teamwork, and it is necessary to establish norms and have a coherent planning of strategies and methods in order to prevent isolation in other forms of communication.

However, teachers also point out that ICT pose technical difficulties. The interpretation of the results leads to a proposal for an evolution in the methodology, the context and the role of the teacher. This involves a set of different actions that extrapolate several components of the educational ecosystem. Multiple studies in this field defend that the working spaces need to have certain characteristics and an adequate planning of the processes (Marqués, 2012; Cacheiro, 2014; Majo & Marte, 2002; Cabero, 2002; Cabero & Romero, 2007; Coll & Nereo, 2008; Rodríguez, 2009; Gómez, 2011).

Finally, this study showed that teachers believe that they do not have an adequate training in ICT use. This finding is particularly relevant, since teachers play an essential role in the processes of educative innovation. In this regard, many studies, like those by Mirete (2010) or González (2016), among others, appropriately emphasize the relevance and influence of teacher training in the education context.

CONCLUSIONS

The first hypothesis, according to which "teachers have a positive perception with regard to the use of ICT in the classroom", has been accepted. The different items in the survey show a high degree of agreement.

The second hypothesis, which claimed that "teachers consider that they have adequate ICT training" has been rejected, since a high percentage (83%) of teachers stated that they did not have an adequate training.

This study reveals the perception of teachers about ICT and their opinion about their own ICT training. We can conclude that the results show a significant difference between the perception of teachers and the training they received. It is necessary to emphasize the digital training of teachers in order to generate a momentum for new strategies mediated by the new information and communication resources, to disrupt the current paradigms and include new activities and uses/resources to promote the learning process among the population who attends these programs.

In view of the references mentioned in the previous paragraphs, we can state that perceptions and opinions of youth and adult elementary education teachers in the Dominican Republic provides some essential components for an instructive assessment of technologies and their role in the process of educational innovation, in spite of the fact that the subjects in the study may not have received the necessary training, or that such training is essential to implement initiatives for innovation. For the future, this study recommends an in-depth analysis of the opinions of perceptions of teachers about the specific structure they would implement as an innovation process, as well as a study of the most adequate and appropriate practices in the education sphere which meet the needs of students, in order to design sustainable and applicable initiatives that are adapted to the profile of the citizens and/or to the competences required by the different generations in our current society.

7. REFERENCES

Adams, R. C. (1989). *Social survey methods for mass media research*. New Jersey: Hillsdale. New Jersey: Lawrence Erlbaum Associates Publishers.

Adell, J., & Castañeda, L. (2012). Tecnologías emergentes, ¿pedagogías emergentes? En H. Hernández.; M. Pennesi.; D. Sobrino y A. Vázquez. *Tendencias emergentes en educación con TIC*. (p.14-33). Barcelona: Espiral. Last accessed: 6/7/2017. http://ciberespiral.org/tendencias/Tendencias_emergentes_en_educacin_con_TIC.pdf

Álvarez-Quiroz G. & Romero, J. (2015). Percepciones de los docentes rurales sobre las TIC en las prácticas pedagógica. *Ciencia, Docencia y Tecnología.* 26 (51). 371-394. https://dialnet.unirioja.es/descarga/articulo/5265877.pdf

Baltes, P., Waring , R., & Nesselroade, J. (1981). *Método de investigación en psicología evolutiva: enfoque del ciclo vital.* (G. Miralles, Trad.) Madrid: Ediciones Morata.

Barrón, M.C. (2009). Docencia universitaria y competencias didácticas. *Perfiles Educativo*s, 31, 125, 76-87, (http://goo.gl/WzquiB) (14-02-2014)

Bautista , G., Borges, F., & Forés, A. (2006). *Didáctica universitaria en entornos virtuales de enseñanza-aprendizaje.* Madrid: Narcea.

Briones, G. (19969. *Metodología de la investigación cuantitativa en las ciencias sociales*. Bogotá: ARFO Editores.

Brower, J., & Christensen, C. (1995). Disruptive technologies: Catching the wave. *HarvardBusiness Review, 73*(1), 43-53. Recovered 2017/7/6 http://www.hbs.edu/faculty/Pages/item.aspx?num=6841

Cabero-Almenara, J., & Romero, R. (2007). *Bases generales para el diseño, producción y evaluación de las TIC en los procesos de formación.* España: UOC. https://dialnet.unirioja.es/servlet/articulo?codigo=2672987

Cacheiro, M. (2014). *Educación y tecnología: estrategia didácticas para la intervención de las TIC.* Madrid: Universidad a Distancia UNED. http://cielo.usal.es

Çakiroğlu, Ü., Yildiz, M., Mazlum, E., Güntepe, T., & Aydin, Ş. (August 2017). Exploring collaboration in learning by design via weblogs weblogs. *Journal of Computing in Higher Education, 29*(2), 309-330. doi: 10.1007/s12528-017-9139-z

Camilo, C. (2009). *La formación de personal de Educación de Personas Jóvenes y Adultas (EDPJA) en República Dominicana: La* experiencia de la maestría del Instituto Tecnológico de Santo Domingo *(INTEC).* http://www.gloobal.net/iepala/gloobal/fichas/ficha.php?id=7721&entidad=Textos&html=1

Camilo, M. (2008). *Situación presente de la educación de personas jóvenes y adultas en República Dominicana*. http://www.oei.es/

Carneiro, R; Toscano, J y Diaz, T. (2009). *Los desafíos de las TIC para el cambio educativo.* Madrid, España: OEI – Fundación Santillana. http://www.oei.es/historico/publicaciones/detalle_publicacion.php?id=10

Carneiro, R; Toscano, J y Diaz, T. (2009). *Los desafíos de las TIC para el cambio educativo.* Madrid, España: OEI – Fundación Santillana. http://www.oei.es/historico/publicaciones/detalle_publicacion.php?id=10

Cea D´ Ancona, María Ángeles (1992). La encuesta psicosocial (1). In Clemente Díaz, M. *Psicología Social: Métodos y Técnicas de Investigación.* Madrid: Eudema Universidad, pp. 264-278.

Cea, M. y Vallér, M. S. (1992). "La encuesta psicosocial (2)". In Clemente D. M. (1992): *Psicología Social: Métodos y Técnicas de Investigación*. Madrid: Eudema Universidad, 1992, pp. 279-301.

Chao-Fernandez, R., Román-García, S., & Chao-Fernandez, A. (21 February 2016). Analysis of the use of ICT through music interactive games as educational strategy. *Social and Behavioral Sciences, 237*(21), 576-580. Last accessed 10/7/2017. http://ac.els-cdn.com.ezproxy.usal.es/S187704281730109X/1-s2.0-S187704281730109X-main.pdf?_tid=5b29edd6-6bda-11e7-a5c5-00000aacb361&acdnat=1500397303_ec6a2214e44871d3a09cac924ffb7f55

Christensen, C. (2012). Disruptive innovation. *Encyclopedia of human-computer interaction. Aarhus, Denmark: The Interaction-Design.org Foundation.* http://www.interaction-design.org/encyclopedia/disruptive_innovation.html

Clemente, A. (1996). *Spicología del desarrollo adulto.* Madrid: Marcea.

Cruz-Benito, J., Therón, R., García-Peñalvo, F., & Pizarro, L. (June 2015). Discovering usage behaviors and engagement in an Educational Virtual World. *Computers in Human Behavior, 47*, 18-25. doi:https://doi.org/10.1016/j.chb.2014.11.028

Dahllstrom , E., Brooks , C., & Bichel, J. (2014). *ECAR study of undergraduate students and information technology, 2014. Louisville,.* http://www.educause.edu/ecar

Dam, R., & Siang, T. (2017). Design Thinking: New Innovative Thinking for New Problems. *Interaccion Desing Foundation*. Last accessed 19/7/2017. https://www.interaction-design.org/literature/article/design-thinking-new-innovative-thinking-for-new-problems

Diseño Curricular del NIvel Básico. Segundo Ciclo . (2016). *Diseño Curricular del Nivel Básico. Segundo Ciclo Vicemeinisterio de Servicios Técnicos y Pedagógicos Subsistema de Educación de Personas Jóvenes y Adultos. Revisión y actualización curricular.* Santo Doningo, República Dominicana: Ministerios de Educación República Dominicana MINERD.

Domingo, M. & Marqués, P. (2011). Aulas 2.0 y uso de las TIC en la práctica docente. *Comunicanicar, XIX*(37), 169-175. doi:https://doi.org/10.3916/C37-2011-03-09

Fernández, F. (2003). Competencias profesionales del docente en la sociedad del siglo XXI. Organización y gestión educativa: *Revista del Fórum Europeo de Administradores de la Educación* (OGE), 11, 1, 4-7 (http://goo.gl/3QBqiQ) (10-02-2014)

García, F., & Said, E. (November 2017). Ciudadanía Digital. *Prisma Social Revista de Ciencias Sociales*(18). Last accessed 21/7/2017. http://revistaprismasocial.es/issue/view/116/showToc

García-Peñalvo, F., Hernández-García, Á., Conde, M., Fidalgo-Blanco, Á., Sein-Echaluce, L., Alier-Forment, M., . . . Iglesias-Pradas, S. (2017). *Enhancing Education for the Knowledge Society Era with Learning Ecosystems.* doi:10.4018/978-1-5225-0905-9.ch001

Gózalez, M. (2016). Formación docente en competencias para mediación de aprendizajes en el proyecto Canima Educativo. *TeloS*. 18(3), 492-507.: http://www.redalyc.org/articulo.oa?id=99346931009

Grandoit, F; Canfux,M; Rivas, J; Myrna, N & Camilo, M. (2008). *Reporte sobre el estado actual de la educación de personas jóvenes y adultas en Haití,*. Revista Interamericana de la Educación de Adultos*, 30*(1), 7-44. http://www.redalyc.org/articulo.oa?id=457545098001

Guitiérrez-Martín, A., & Tyner, K. (2012). Educación para los medios, alfabetización mediática y competencia digital. *Comunicar, XIX*(38), 31-39. doi:https://doi.org/10.3916/C38-2012-02-03

Hernández-Carranza, E.; Romero-Corella, S. & Ramírez-Montoya, M. (2015). Evaluación por competencias digitales didácticas en cursos masivos abiertos: Contribución al movimiento latinoamericano. Revista *Científica de EducoComunicación.* XXII(44), 81-90. DOI http://dx.doi.org/10.3916/C44-2015-09

Herrero-Gutiérrez, F. & Acle V. D. (2013). "Lenguaje y dicción en las retransmisiones deportivas radiofónicas: La percepción según los oyentes castellanoleoneses". *Revista Mediterránea de Comunicación*, vol. 4, 2, 5-33. doi: 10.14198/MEDCOM2013.4.2.01.

Ladd W. (2008). Kurt L. *Social and Personality Psychology Compass, 2*(4), 1638-1650. doi:10.1111/j.1751-9004.2008.00131.x

Ley No. 153-98. (1998). *Ley General de Telecomunicaciones No. 153-98*. Congreso Nacional, República Dominicana. http://www.sice.oas.org/investment/NatLeg/RDM/L_TeleCom_s.pdf

Liu, M., Kang, J., Zou, W., Lee, H., Pan, Z., & Corliss, S. (1-28 July 2017). Using Data to Understand How to Better Design Adaptive Learning. *Springer Science+Business Media B.V, 22*(61). doi:10.1007/s10758-017-9326-z

Malcolm K. (1980). Malcolm Knowles on... *Training & Development Journal, 34*(5), 96. http://web.b.ebscohost.com.ezproxy.usal.es/ehost/detail/detail?vid=0&sid=70923032-d05e-4827-97f7-4891ed3209bb%40sessionmgr103&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#db=bsu&AN=9069883

Marqués, P. (2013). Impacto de las TIC en el educación: funciones y limitaciones. (S. Editada por Área de Innovación y Desarrollo, Ed.) *3 c TIC: Cuadernos de desarrollo aplicados a las TIC, 2*(1), 1-15. Last accessed 6/6/2017. https://dialnet.unirioja.es/servlet/articulo?codigo=4817326

Mauceri, S. (May de 2016). Integrating quality into quantity: survey research in the era of mixed methods. *Quality & Quantity, 50*(3), 1213-1231. doi: 10.1007/s11135-015-0199-8

McCloskey, E. (2012). Docentes globales: un modelo conceptual para el desarrollo de la competencia intercultural on-line. *Comunicar, XIX*(38), 41-49. doi:https://doi.org/10.3916/C38-2012-02-04

McGloin, R., McGillicuddy, K., & Christensen, J. (2017). The impact of goal achievement orientation on student technology usage in the classroom. *Journal of Computing in Higher Education, 29*(2), 240-266. doi:10.1007/s12528-017-9134-4

Medina, O. (1997). *Modelo de educación de personas adultas.* Barcelona: El Roure Editorial, S.A.

Ministerio de Educación. (1997). *Ley 66-97 General de Educación.* Santo Dominigo. Last accessed 2/6/2017. https://www.dol.gov/ilab/submissions/pdf/20100408-12.pdf

Mirete, A. (2010). Formación docente en TIC. ¿Están los docentes preparados para la (r)evolución TIC?. *Journal of Developmental and Educational Psychology*. 4(1), 35-44. http://www.redalyc.org/articulo.oa?id=349832327003

Mortensen, D. (2017). Three Ideation Methods to Enhance Your Innovative Thinking. *Internation Design Foundation*. Last accessed 19/7/2017. https://www.interaction-design.org/literature/article/three-ideation-methods-to-enhance-your-innovative-thinking

Oficina Nacional de Estadística ONE. (2015). *Encuesta nacional de hogares de propósitos múltiples (ENHOGAR-2015).* República Dominicana. Last accessed 21/7/2017. http://www.one.gob.do/Estadisticas/191/tecnologias-de-la-informacion-y-las-comunicaciones

Pérez, M.; Romero, M. & Romeu. T. (2014). La construcciо́n colaborativa de proyectos como metodologiа́ para adquirir competencias digitales. *Comunicar.* XXI(42), 15-24. https://search-proquest-com.ezproxy.usal.es/docview/1499821833/fulltext/3869008E6D69427CPQ/1?accountid=17252

Picón, E.; Varela M. J. & Braña T. (2013). TIC y libros de textos: percepciones de los docentes. Investigación en la escuela. 81:91-113. http://www.investigacionenlaescuela.es/articulos/81/R81-7.pdf

Programa de las Naciones Unidad para el Desarrollo (PNUD). (2015). *Informe sobre el desarrollo humano 2015*. New York. United States: PBM Graphics. http://hdr.undp.org/sites/default/files/hdr_2015_report_sp.pdf

Ramírez, A; Renés, P & Aguaded, I. (July-December 2016). La competencia mediática en los criterios de evaluación del currículo de educación primaria. *Aula Abierta. Elsever, 44*(2), 55-62. doi:http://dx.doi.org/10.1016/j.aula.2015.08.002

Ramírez, E., Cañedo, I., & Clemente, M. (2012). *Las actitudes y creencias de los profesores de secundaria sobre el uso de Internet en sus clases*. Cominicar, 147-155. doi:https://doi.org/10.3916/C38-2012-03-06

Romero-Martín, R.; Castejón-Oliva, F.; López-Pastor, V. & Fraile-Aranda, A. (2017). Evaluación formativa, competencias comunicativas y TIC en la formación del profesorado. *Comunicar, 25*(52), 73. doi:https://doi.org/10.3916/C52-2017-07

Salkind, Neil K. (1998), (Traducción: R. L. Escalona; revisión técnica: V. Valdés Salmerón). *Métodos de investigación*. México: Prentice Hall.

Secretaría de Estado de Educación . (2008). *Plan Decenal de Educación 2008-2018*. Secretaría de Estado de Educación . Santo Domingo : Gestión Educativa. Last accessed 3/3/2017. http://www.sipi.siteal.iipe.unesco.org/sites/default/files/sipi_intervencion/republica_dominicana_plan_decenal_de_educacion_2008-2018.pdf

Sein-Echaluce , M., Fidalgo-Blanco , Á., & Alves, G. (July 2017). Technology behaviors in education innovation. *Computers in Human Behavior, 72*, 596-598. doi:https://doi.org/10.1016/j.chb.2016.11.049

Tejedor, J., García-Valcárcel, A., & Prada, s. (October 2009). Medida de actitudes del profesorado universitario hacia la integración de las TIC. *Cominicar, XVII*(33). doi:https://doi.org/10.3916/c33-2009-03-002

TICSE 2.0,. (2013). *Opiniones, expectarivas y valoraciones del profesorado participante en el Programa Escuela 2.0 en España.* Ministerio de Ciencia e Innovación. Dirección General de Investigación y Gestión del Plan Nacional I+D+I, TICSE 2.0,. España: Universidad de la Laguna. Last accessed 19/3/2017. https://ampaipse.files.wordpress.com/2012/01/informe_escuela20-prof2011.pdf

Torrente, D. & Bosch, J. (1993). Encuestas telefónicas y por correo. Madrid: Centro de Investigaciones Sociológicas.

UNESCO (2008). Estándares de competencias en TIC para docentes (e-book). Santiago, Chile: Centro de Educación y Tecnología del Ministerio de Educación de Chile. (http://goo.gl/t0HG3G) (20-03-2014).

Von, E. (2011). Open user innovation Open user innovation. *Interaccio Desing Foundation*. https://www.interaction-design.org/literature/book/the-encyclopedia-of-human-computer-interaction-2nd-ed/open-user-innovation

Wilson, C. (October 2012). Media and Information Literacy: Pedagogy and Possibilities. *Comunicar, XX*(39), 15-24. doi:https://doi.org/10.3916/C39-2012-02-01

Zabalza, M.A. (2003). *Competencias docentes del profesorado universitario. Calidad y desarrollo profesional*. Madrid: Narcea.